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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,377	10/21/2003	Michael Francis Higgins	AB-2914 US	8648

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EXAMINER	
MA, TIZE	

ART UNIT	PAPER NUMBER
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/691,377	HIGGINS ET AL.	
	Examiner	Art Unit	
	TIZE MA	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 January 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/16/2009 has been entered.

Response to Arguments

2. Applicant's arguments, filed on 1/16/2009, with respect to claims 1-3, 5-13, 15-17, 19-28 have been considered but are moot in view of the new ground(s) of rejection. Claims 1-13 and 15-26 are now rejected under 35 U.S.C. 103(a) as being unpatentable over Childs et al (GB 2282928 A), and in view of Murdock et al (US 6,897,876 B2), and further in view of Kobayashi (US 5,937,089). Kobayashi discloses gamut mapping by detecting image data points that are out-of-gamut; effecting a change in the out-of-gamut image data points to produce a color image data point that is within gamut range by applying a scaling factor including a ratio between the maximum allowed value and the maximum value of C1, C2, C3, and W (column 5, line 19-column 6, line 15). The combination of Childs et al, Murdock et al, and Kobayashi would render the independent claims 1 and 15 obvious to one of ordinary skill in the art at the time of the invention was made. Kobayashi also discloses correcting all four colors by using the scaling factor, recited in claim 13 (column 5, lines 29-31). Therefore claims 1-13, and 15-26 remain

rejected. Claims 27-28 are now rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US 5,937,089), and in view of Murdock et al (US 6,897,876 B2). Kobayashi discloses gamut mapping by detecting any said second colored image data as being out-of-gamut in said second color space; scaling the color components of the out-of-gamut second colored image data with a ratio between the maximum allowed value and the maximum coefficient of said out-of-gamut second colored image data. (column 5, line 19-column 6, line 15). The term “coefficient” is treated like a quantity, basically the same as the term “value”.

3. Applicant's arguments, with respect to claims 4 and 18, have been fully considered but they are not persuasive.

Regarding claims 4 and 18 applicant argues that " As explained in paragraphs [0012] and [0013], the coefficients Cr, Cg, Cb, and Cw are calculated by using the white point (Xw, Yw, Zw) and the RGBW value. Although the Office Action states that Childs teaches this limitation at pages 6 and 7, specifically pointing to equations 1f and 2b-2d (see Office Action, page 9, point 35), the cited section fail to teach this limitation. Childs' equation 1f has four unknowns, 1, ml, m2, and n but these do not correspond to the "four colors of the four-color image data set" as recited in Claim 1. Specifically, l corresponds to red, ml and m2 correspond to green, and n corresponds to blue. Hence, there are no "coefficients for the four colors" in Childs' equations. Equations on Childs' page 7 work with three coefficients, one for each of red, green, and blue.

The examiner disagrees. Although the specification states that the coefficients Cr, Cg, Cb, and Cw are calculated ..., as the applicant quoted, the claim 1 does not specify

what the four colors, C1, C2, C3, and W, are. Childs solves those equations and obtains the coefficients for the four colors. Any four colors would read on the claim. Therefore claims 4 and 18 remain rejected.

4. Applicant's arguments, with respect to claim 14, have been fully considered but they are not persuasive.

Regarding claim 14, applicant argues that: The Application discloses using maximum RGBW values as an index into a table of inverse values (see Application, paragraph [0029] to [0030]). In contrast, neither reference discloses "an inverse look-up table." Although the Office Action cites to Lin's column 20, lines 19-22 as disclosing this element (see Office Action, page 13, top paragraph), the cited section describes an interpolation technique using a look-up table and says nothing about inverse values that are used for scaling. Likewise, Cui's paragraphs 29- 32, which the Office Action alleges discloses the scaling factor being an inverse value of a function of the maximum coefficient (see Office Action, page 13, point 48), says nothing about using a look-up table that stores inverse values that are used as a scaling factor. Hence, Claim 14 is patentable over Lin and Cui.

The examiner disagrees. First of all, the claim uses the language of "an inverse value of a function of the maximum coefficient". Since the "function" is not specified in the claim, "an inverse value of a function" is still some function. Therefore the phrase "the scaling factor being an inverse value of a function of the maximum coefficient" is the same as "the scaling factor being some function of the maximum coefficient". Second, the claim recites "an inverse look-up table, said table storing said scaling

factors, ...". The term "inverse look-up table" is just the name of the table which stores the scaling factors. The examiner does not give any weight to the word "inverse" since the table can be given any names. In summary, Lin teaches calculating the factors and store the factors using look-up tables; and Cui discloses calculating the scaling factor being some function of the maximum coefficient. The combination of Lin and Cui would render claim 1 obvious to one of ordinary skill in the art at the time of the invention was made. Claim 14 remains rejected.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-13 and 15-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Childs et al (GB 2282928 A), and in view of Murdock et al (US 6,897,876 B2), and further in view of Kobayashi (US 5,937,089).

8. Regarding claim 1 and 15, Childs et al teaches a method and a system (decoding circuit) for converting a three-color image data set (video signal) to four-color image data set (see Fig. 4 and lines 17-20 on page 12) by dividing (dissecting) the color space into a set of regions (triangles) (see lines 9-10 on page 6, and Fig. 5), and determining the mapping from the three-color image data points to four-color image data points (a set of numerical solutions) (see lines 19-20 on page 13 and Appendix 1 on page 25). Childs et al uses the white point in his computation (see D65 in Fig. 3, and last three lines on page 5 and equation 1f on page 6).

9. However, Childs et al does not teach that W (white color) is used as a primary color in the target (four-color after conversion) color space.

10. Murdock et al teaches a method for converting three color (R, G, B) image data set (input signals) to four color (R', G', B', W) image data set (output signals) (see column 3, lines 49-54, and column 4, lines 56-61), where W is the white color for the benefit that employing a white OLED (Organic Light Emitting Diodes) along with the red, green, blue OLEDs to improve power efficiency and/or luminance stability of displays over time(column 1, lines 26-28). If the points representing the all the primary colors were connected by lines, i.e., connecting the points of R, G, B, and W by lines, the region in the color space would be divided into triangles bounded by W and two of R, G, and B.

11. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to converting a three-color image data set into a four-color image data set, by dividing a color space into regions, and determining a mapping from image data points comprising three colors to image data points comprising four colors with one of the colors as W (white) for the benefit of improving power efficiency and/or luminance stability of displays over time.

12. However, the combination of Childs et al and Murdock et al does not teach detecting image data points that are out-of-gamut; effecting a change in the out-of-gamut image data points to produce a color image data point that is within gamut range by applying a scaling factor including a ratio between the maximum allowed value and the maximum value of C1, C2, C3, and W, although Murdock et al discloses that any known gamut-mapping techniques may be applied to do the correction (column 6, line 35-40).

13. Kobayashi teaches a method and system (apparatus) for detecting image data points that are out-of-gamut; effecting a change in the out-of-gamut image data points to produce a color image data point that is within gamut range by applying a scaling factor including a ratio between the maximum allowed value and the maximum value of C1, C2, C3, and W (column 5, line 19-column 6, line 15) for the benefit of reducing color distortion as converting color images from an input device to an output device (see column 2, lines 9-12).

14. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the out-of-gamut color mapping after color space

conversion as shown in Kobayashi in the previous combination for the benefit of reducing color distortion as converting color images from an input device to an output device.

15. Regarding claims 2 and 16, Murdock et al teaches R, G, B as the three primary colors (see Fig. 1 and column 4, lines 56-61).

16. Regarding claims 3 and 17, Childs et al teaches divided regions as triangles (lines 9-10 on page 6; Fig. 5). When W (white) is used as a primary, as in Murdock et al (column 3, lines 48-52), the triangles are bounded by W and two of three primary colors, R, G, B.

17. Regarding claims 4 and 18, both references teach setting the white point to a desired value, and calculating the conversion coefficients/matrices (e.g., Column 5, lines 22-24 in Murdock et al; equations 1f on page 6, 2b-2d on page 7 in Childs et al). Although Childs et al does not disclose using white point as one of the primary colors, the relationship between the white color and the RGB is still the same as when the white color is chosen as a primary color. (Note: The claim 1 does not specify what the four colors, C1, C2, C3, and W, are. Childs solves those equations and obtains the coefficients for the four colors. Any four colors would read on the claim.)

18. Regarding claims 5 and 19, the equation is taught as conventional in Childs et al (see page 6, line 1 in Childs et al. The technique disclosed in Childs et al is applicable to the instant application. The far right column in equation 1f would be the values of Cr, Cg, Cb, Cw as in the instant claim if the four primary colors are chosen as RGBW as in Murdock).

19. Regarding claims 6 and 20, Murdock et all teaches setting different white point (additional primary close to white, see column 6, line 2-6). The actual values would be determined to adjust to different backlight condition.

20. Regarding claims 7 and 21, Murdock et all teaches setting different white point (additional primary close to white, see column 6, line 2-6). The actual values would be determined to adjust between the difference between the white points of source and target.

21. Regarding claims 8 and 22, Childs et al teaches calculating the mapping to four color space from intermediate coefficients with matrix (see lines 8-29 on page 11 for the description of the calculation. The equation 3j on page 11 is equivalent to the equation in the instant claims). Since Childs et al does not use W as a primary color, Murdock et al is closer to the calculation in the instant claims. In Murdock et al, wherein W is chosen as a primary, the calculation is disclosed in column 6, lines 3-30. Numerically solving equation between line 25 and 30 in column 6, would yield the equations in the instant claims.

22. Regarding claim 9, both references teach calculating source and destination colors for groups of known primaries and white points (see page 4, line 26-32 in Child et al for calculating source color; page 5, line 15-20 for calculating destination color) and numerically solving for the mapping (see the numerical solutions on page 25, Appendix 1 in Child et al). In Murdock et al, wherein W is chosen as a primary, the calculation is disclosed in column 6, lines 3-30. The equation between line 25 and 30 in column 6, is numerically solved.

23. Regarding claims 10 and 23, Kobayashi teaches detecting four color image data points that are out-of-gamut; effecting a change as a function of the out-of-gamut coefficients to produce a color image data point that is within gamut range (Fig. 1, column 5, line 24-column 1, line15).

24. Regarding claims 11 and 24, testing each color component of the image data point to see if the color component is out of range is common practice of detecting out-of-gamut (Kobayashi: Fig. 1, between polyhedron 2 and polyhedron 4).

25. Regarding claims 12 and 25, Kobayashi teaches the maximum allowed value as the chroma magnitude of the largest coordinate (Fig. 6, values on the polygon). It is also the color value on the target gamut boundary.

26. Regarding claims 13 and 26, Kobayashi teaches correcting all four colors by using the scaling factor (column 5, lines 29-31).

27. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (US 6,421,142 B1), and in view of Cui et al (US. Pub. 2004/0056867 A1).

28. Regarding claim 14, although using the different terminology, the instant claim is covered by Lin et al as part of his out-of-gamut color mapping strategy. Lin et al teaches an input channel to receive image data points (Fig. 1 input device 10); maximum coefficient detector (in Lin et al, the process of projection and clip is to find a corresponding color point on the boundary of the output gamut for the out-of-gamut color point. Therefore, the unit 87 along with unit 82 (87 labeled PROJ/CLIP CHROMA and 82 labeled CHECK GAMUTS in Fig. 15) performs the function of a maximum coefficient detector and a scaling unit. The maximum refers to the chroma magnitude of

the largest coordinates (line 50 in column 14) in the color space in the method of projection/clip (element 87 in Fig 15)); calculating a scaling factor for out-of-gamut image data point, and projecting out-of-gamut colors into the gamut boundaries. Such projection preserves the hue angle (which is equivalent to the coefficients of the interpolations in Lin et al, e.g., column 19, lines 30-43. See column 11, lines 27-61, and Fig. 6 for projections); an inverse look-up table (LUT) to store the scaling factors (LUT and interpolation coefficients (see column 20, line 19-22) and a scaling unit (the unit 87 along with unit 82 in Fig. 15). (Note: The term “inverse look-up table” is treated as just ”look-up table” since there is no significant meaning given to the word “inverse” in the claim).

29. However, Lin et al does not disclose the details for said scaling factor being a inverse value being a function of the maximum coefficient detected by said maximum coefficient detector; and said unit employing said scaling factor and changing the coefficients of said image data points to effect an in-gamut image data point (Note: the term “said scaling factor being a inverse value being a function of the maximum coefficient” is treated as “said scaling factor being a function of the maximum coefficient”, since the function is not specified.)

30. Cui et al, in the same field of gamut mapping and for solving the same problem, teaches said scaling factor being a inverse value being a function of the maximum coefficient detected by said maximum coefficient detector; and said unit employing said scaling factor and changing the coefficients of said image data points to effect an in-gamut image data point (paragraphs [0029]-0032]. The equations (1) and (2) employs

the scaling factor and go the gamut mapping. The ratio (L(T')-L(B'))/(L(T)-L(B)) is the scaling factor). Such a mapping preserves hue.

31. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the out-of-gamut color mapping systems as shown in Lin at el and Cui et al for benefit of preserving hue.

32. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi, and in view of Murdock et al.

33. Regarding claim 27, Kobayashi teaches a method for scaling out-of-gamut colors when mapping first colored image data in a first space to second colored image data into a second color space (column 2, lines 21-28), the steps of said method comprising:

mapping said first colored image data to said second colored image data (column 2, lines 26-28);

detecting any said second colored image data as being out-of-gamut in said second color space (column 5, lines 19-31);

scaling the color components of the out-of-gamut second colored image data with a ratio between the maximum allowed value and the maximum coefficient of said out-of-gamut second colored image data (column 5, line 19-column 6, line 15).

34. However, Kobayashi does not teach that the first color space is a three-color space and the second color space comprises more than three colors wherein one such more than three colors is white.

35. Murdock et al teaches color space conversions from three colors to four colors, where one of four colors is white (column 3, lines 48-54) and that known gamut-

mapping technique may be applied to map out-of-gamut colors into the target gamut range (column 6, lines 32-41).

36. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the out-of-gamut color mapping method as shown in Kobayashi in the situation of Murdock et al.

37. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi, and in view of Murdock et al, and further in view of Lin et al.

38. Regarding claim 28, the combination of Kobayashi and Murdock et al remains as applied to claim 27 above. However the combination does not explicitly show wherein said step of scaling further comprises the step of looking up said scaling factor in an inverse look-up table. Lin et al teaches using look-up table (LUT) to store the coefficients (see column 20, line 19-22; column 17, lines 10-14). The scaling factors are coefficients. It would have been obvious to store the scaling factors in a look-up table. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method as shown in the combination of Kobayashi and Murdock et al with Lin et al by storing the scaling factors in a look-up table.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIZE MA whose telephone number is (571)270-3709. The examiner can normally be reached on Mon-Fri 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao M. Wu can be reached on 571-272-7761. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tm

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